

CLAIMS

1. Apparatus for delivering a drug to a target site of a body comprising:
a dispersing member adapted to vibrate when acoustically excited;
5 a source of acoustic energy controllable to couple acoustic energy to the dispersing member to excite it to vibrate; and
a drug adhered to the dispersing member so that when the acoustic source excites the dispersing member, the drug is dispersed therefrom.
- 10 2. Apparatus according claim 1 wherein the dispersing member comprises an elongate body having an axis along its long direction.
3. Apparatus according claim 1 or claim 2 wherein the dispersing member is characterized by relatively abrupt changes in its cross section perpendicular to the axis as a function of
15 position along the axis.
4. Apparatus according claim any of claims 1-3 wherein the dispersing member comprises a plurality of relatively large cross section regions separated by relatively small cross section regions.
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5. Apparatus according claim 4 wherein the relatively large cross section regions have chamfered edges.
6. Apparatus according any of the preceding claims wherein the dispersing member
25 comprises a plurality of cone shaped sections having relatively small first ends and relatively large second ends.
7. Apparatus according claim 6 wherein the first ends face a same direction.
- 30 8. Apparatus according claim 7 wherein the size of the cone shaped sections decrease as a function of distance along the dispersing member axis in the direction along which the first ends face.

9. Apparatus according any of the preceding claims, wherein the dispersing member has a spiral screw shape.

10. Apparatus according to any of the preceding claims wherein the dispersing member is
5 integrally formed as a portion of a catheter wire.

11. Apparatus according to claim 10 and comprising a catheter that comprises the catheter wire.

10 12. Apparatus according to claim 1 wherein the dispersing member comprises a spring having at least one coil formed from a wire and an axis.

13. Apparatus according to claim 12 wherein the at least one coil comprises a plurality of coils.
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14. Apparatus according to claim 13 wherein all of the coils have a same size.

15. Apparatus according to claim 13 wherein adjacent coils have different size.

20 16. Apparatus according to claim 13 or claim 14 wherein non-adjacent coils have a same size.

17. Apparatus according to any of claims 13, 14 or 16 wherein the coils comprise at least one relatively large first coil and at least one relatively large second coil and at least one
25 intermediate coil smaller than the at least one first and at least one second coil located between them.

18. Apparatus according to claim 17 and comprising a barrier adhered between the at least one first coil and the at least one second coil.

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19. Apparatus according to claim 18 wherein the barrier forms a surface having a lumen in which the at least one intermediate coil is located.

20. Apparatus according to claim 13 or claim 15 wherein the spring has a tapered shape in which the size of its coils decrease along a direction from a first end of the spring to a second end of the spring.
- 5 21. Apparatus according to any of claim 13-20 wherein the coils have a constant pitch.
22. Apparatus according to any of claims 13-21 wherein all coils have a same shape.
23. Apparatus according to any of claims 12-22 wherein a coil of the at least one coil is
10 circular.
24. Apparatus according to any of claims 12-23 wherein the dispersing member is integrally formed as a portion of a catheter wire.
- 15 25. Apparatus according claim 24 and comprising a catheter that comprises the catheter wire.
26. Apparatus according to any of claims 12-25 wherein the coils of the spring are expandable.
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27. Apparatus according claim 26 and comprising a housing in which the spring may be housed with its coils compressed and from which it may be removed enabling the coils to expand.
- 25 28. Apparatus according claim 27 wherein the housing comprises ridges that are substantially parallel to the axis of the spring dispersing member and contact at least some of the compressed coils when the dispersing member is housed in the housing.
29. Apparatus according claim 27 or claim 28 and comprising a catheter wherein the
30 housing comprises a portion of the catheter
30. Apparatus according to any of claims 12-29 wherein the dispersing member is integrally formed as a portion of a catheter wire.

31. Apparatus according to claim 1 wherein the dispersing member has a stent-like configuration.

5 32. Apparatus according claim 31 wherein the stent-like configuration has a compressed and an expanded state.

33. Apparatus according claim 32 and comprising a housing in which the dispersing member may be housed in its compressed state and from which it may be removed and changed into its expanded state.

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34. Apparatus according to any of the preceding claims and comprising a jacket in which the dispersing member is positioned that has at least one exit port formed therein through which particles of the substance dispersed by the dispersing member exit.

15 35. Apparatus according claim 34 wherein the jacket is filled with a liquid, which when the dispersing member is positioned in the site or a neighborhood thereof, protects the dispersing member from contact with material at the site or in the neighborhood.

20 36. Apparatus according to any of the preceding claims wherein the source of acoustic energy couples at least one pulse of acoustic energy to the dispersing member and controls at least one characteristic of the at least one acoustic pulse to control dispersion of the substance.

25 37. Apparatus according to claim 36 wherein the acoustic source controls the at least one characteristic to control kinetic energy of particles of the substance dispersed from the dispersing member.

38. Apparatus according to claim 36 or claim 37 wherein the at least one characteristic comprises amplitude of the at least one acoustic pulse.

30 39. Apparatus according to any of claims 36-38 wherein the at least one characteristic comprises frequency of the at least one acoustic pulse.

40. Apparatus for delivering a drug in a neighborhood of a target site of a body to the site comprising:

a dispersing member comprising at least one coil formed from a wire; and

a source of acoustic energy controllable to couple acoustic energy to the dispersing member to excite it to vibrate; wherein

when the drug and the dispersing member are located in a neighborhood of the site and the acoustic source excites the dispersing member, the dispersing member transmits acoustic waves that tend to propel the substance to the site.

41. Apparatus for delivering a drug in a neighborhood of a target site of a body to the site comprising:

a dispersing member comprising an elongate screw shaped body; and

a source of acoustic energy controllable to couple acoustic energy to the dispersing member to excite it to vibrate; wherein

when the drug and the dispersing member are located in a neighborhood of the site and the acoustic source excites the dispersing member, the dispersing member transmits acoustic waves that tend to propel the substance to the site.

42. Apparatus for delivering a drug in a neighborhood of a target site of a body to the site comprising:

a dispersing member comprising an elongate body having an axis and a cross section perpendicular to the axis that changes relatively abruptly as a function of position along the axis; and

a source of acoustic energy controllable to couple acoustic energy to the dispersing member to excite it to vibrate; wherein

when the drug and the dispersing member are located in a neighborhood of the site and the acoustic source excites the dispersing member, the dispersing member transmits acoustic waves that tend to propel the substance to the site.

43. Apparatus for delivering a drug in a neighborhood of a target site of a body to the site comprising:

an expandable dispersing member having a compressed and an expanded state;

a source of acoustic energy controllable to couple acoustic energy to the dispersing member to excite it to vibrate; wherein

wherein the drug is located in a neighborhood of the site and the dispersing member is transported to the neighborhood in the compressed state and at the neighborhood is transformed to its expanded state and when the acoustic source excites the dispersing member in the expanded state the dispersing member transmits acoustic waves that tend to propel the drug to the site.

44. A method of delivering a drug to a target site of a body comprising:
providing a dispersing member adapted to vibrate when acoustically excited;
adhering a drug to the dispersing member so that when the excited to vibrate the drug is dispersed therefrom;
positioning the dispersing member at the site or a neighborhood thereof; and
acoustically exciting the dispersing member.

45. A method according to claim 44 wherein providing a dispersing member comprises providing an expandable dispersing member having a compressed and an expanded state.

46. A method according to claim 45 wherein positioning the dispersing member comprises transporting the dispersing member to the site or a neighborhood thereof in the compressed state.

47. A method according to claim 46 wherein acoustically exciting the dispersing member comprises transforming the dispersing member to its expanded state at the site or the neighborhood thereof.